

and rendered less sharp, but certain lines are unaltered in wave-length, while others increase by amounts of the order of a few hundredths of an Ångström unit per atmosphere increase of pressure. There seems to be no connection between the influence of pressure on the wave-length and the Zeeman effect in the case of bromine, although there may possibly be such a connection in the case of nitrogen peroxide.

SOLUTIONS of the examples in "A Sequel to Elementary Geometry," by Mr. J. W. Russell, which was reviewed in the issue of NATURE for February 6 last (vol. lxxvii., p. 315), have been prepared by the author, and published at the Clarendon Press, Oxford. The price of this key is 3s. 6d. net.

OUR ASTRONOMICAL COLUMN.

STRUCTURE OF THE CORONA.—In No. 19, vol. ii., of the *Mitteilungen der Nikolai-Hauptsternwarte zu Pulkowo*, Prof. Hansky discusses the results derived from a study of the photographs of the corona taken by the Pulkowa expedition at Alcôcêbre (Spain) during the total solar eclipse of August, 1905. The principal aim of the photographs was to determine the velocity of the propagation of coronal matter in space, and the eight exposures were therefore arranged symmetrically about mid-eclipse, and given approximately equal times.

Each streamer and prominence shown on the photographs is discussed very fully, and Prof. Hansky finally draws the following conclusions. The corona of 1905 was of the "maximum" type, and was divided into eight groups of streamers, arranged symmetrically about the sun's axis. It appears probable that the forms and directions of the coronal streamers depend upon the forms and directions of the prominences above which they are found. In this conclusion Prof. Hansky's result agrees with that recently published by Dr. W. J. S. Lockyer (see NATURE, No. 2005, p. 514). The centres of emission of the streamers, though often near spots, do not coincide with them. Those streamers which occur over great prominences are readily distinguishable by their forms. The jets of prominences resemble jets of matter, the observed velocity of which approximates to 200 km. per sec. Any movement of coronal clouds above prominences is shown to be very slow, its velocity not exceeding 30 km. per sec.; this is so small that any such movement during the three minutes of totality would not produce a change of position sufficiently great to exceed the limits of observational errors.

SPECTROSCOPIC BINARIES NOW UNDER OBSERVATION.—With the view of assisting in the prevention of unnecessary duplication in the observation of spectroscopic binaries, Prof. Frost, director of the Yerkes Observatory, recently addressed a circular letter to the principal observers in this work asking them to furnish him, for publication in the *Astrophysical Journal*, with a list of the objects now under observation at the several institutions. The various replies appear in No. 2, vol. xxvii., of the journal (p. 161), and show that duplicate observations are already in progress. Prof. Hartmann points out, whilst furnishing a list of stars, that duplication is not necessarily an evil, for, with the determination of radial velocities still in a state of evolution, such duplication serves as an independent check on the various results. Prof. Pickering suggests several pieces of work where cooperation would probably lead to useful results, and points out that, even with an objective-prism spectrograph, the star ζ Ursæ Majoris shows marked irregularities in its spectrum which have not yet been accounted for.

THE RELATION BETWEEN THE COLOURS AND PERIODS OF VARIABLE STARS.—In an interesting paper which appears in No. 4238 of the *Astronomische Nachrichten* (p. 209, March 9), Herr S. Beljawsky, Göttingen, discusses at some length the relation found to exist between the colours and the periods of variable stars. From the tables and curves given in the paper it is seen that in general the

variable stars of long period are much redder than the short-period variables. Regarding the amplitudes of the typical light-curves, it is found that up to periods of 200 days the amplitude increases with the period, beyond 200 days it appears to remain constant.

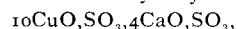
A FIELD METHOD OF DETERMINING LONGITUDES.—Paper No. 5 of the Egyptian Survey Department is devoted to an explanation, by Mr. E. B. H. Wade, of an instrument designed by him for making field determinations of longitude by observations of the moon. By a system of mirrors placed at the object-glass end of a small $2\frac{1}{2}$ -inch telescope, Mr. Wade successively brings the images of two stars in contact, tangentially, with the limb of the moon, thus finding the times of equal lunar distance. The apparatus is ingeniously designed, and is readily portable. Full explanations of the instrument and the method are given in the paper, which is illustrated by a number of diagrams and curves.

OBSERVATIONS OF EROS.—The results of ten measures of the position of Eros, made with the 15-inch refractor of the Uccle Observatory during the period September 25 to October 19, 1907, are published in No. 4240 of the *Astronomische Nachrichten* (p. 252, March 23) by Herr G. Van Biesbroeck. Comparing the positions thus determined with those given in the ephemeris published in the "Berliner Jahrbuch" for 1909, it is seen that the mean corrections to the latter are -1.108 in R.A. and $-8''.0$ in declination.

VARIABLE RADIAL VELOCITY OF η VIRGINIS.—A note in No. 2, vol. xxvii., of the *Astrophysical Journal* (p. 160, March) gives the provisional elements of the orbit of the brighter component of η Virginis, as determined at the Ottawa Observatory by Mr. W. E. Harper. The period is found to be 71.9 days, the velocity of the system $+2.2$ km. per sec., the eccentricity of the orbit 0.4, and the length of the semi-major axis 25,750,000 km. The velocity-curve shows a variation from -40 km. to $+20$ km.

AGRICULTURAL EXPERIMENTS AND REPORTS.

THE eighth report of the Woburn Experimental Fruit Farm contains a very valuable investigation of the washes commonly used for spraying fruit trees. They have hitherto been made up in rather a haphazard way, without much reference to the chemical changes involved, and Mr. Pickering is to be congratulated on having reduced them to a scientific basis. He shows that Bordeaux mixture (obtained by precipitating copper sulphate solution with lime) made in the ordinary way consists of



but this is not so economical as another precipitate, $4\text{CuO}, \text{SO}_3$, for obtaining which full instructions are given. An investigation of the "Woburn wash" (paraffin emulsion and caustic soda) led to a very important examination of emulsions in general, which has enabled Mr. Pickering to state the conditions under which they may be expected to form. When oil is churned with water it is broken up into very minute particles; if still smaller particles of an insoluble substance are present they coat the oil drops and prevent them from coalescing; an emulsion is therefore formed. During the progress of this work Mr. Pickering discovered a new emulsion which promises to be of great service to the fruit-grower. Basic copper sulphate (obtained by adding lime to ordinary copper sulphate) was churned with oil and water, and gave a perfect emulsion to which caustic soda could be added without any adverse effect. The result is a wash containing the three things which have to be used in winter and spring; the grower can therefore get them all on in one operation instead of in three as hitherto. The insecticidal and fungicidal action of these and other washes was also investigated, and there is a discussion of the nature of the action of insecticides.

Of late years molasses has been increasingly used as cattle food, and various agricultural stations have investigated its digestibility and nutritive value. A Bulletin

recently issued by the Massachusetts Experiment Station (No. 118) gives the results of experiments by Lindsey, Holland, and Smith. They found that any large quantity of molasses depresses the digestibility of the other constituents of the ration; this is known to be the general effect of too much carbohydrate. Molasses proved less economical than ordinary farm foods; it proved, however, a valuable condiment, and induced the animals to eat unpalatable and inferior fodder which otherwise they would have refused. It was also found to keep the animals in good condition. Two or three pounds a day is recommended as the proper allowance for cows and horses.

In a paper recently read before the Canterbury Farmers' Club, Mr. E. S. Salmon gives the history of the Gooseberry Mildew Order of July, 1907. This was the first order issued by the Board of Agriculture under the new Destructive Insect and Pest Act, an Act largely due to Mr. Salmon's tireless exertions on behalf of fruit-growers. By the terms of the order the gooseberry mildew is a notifiable disease under a penalty not exceeding ten pounds; the local authority, on receiving notice of its existence, is required to make the grower destroy immediately all diseased bushes, and then spray with an approved fungicide all surrounding bushes. The payment of compensation for the destroyed bushes is optional on the part of the local authority, but the necessary money must be provided out of the rates, as no Treasury grant is available. Mr. Salmon states that the order is not being carried out, and that there has been no systematic destruction of diseased bushes, because the councils have been unwilling to destroy bushes without compensation, and afraid to draw the necessary money from the rates. The result has been that the disease is spreading rapidly, and is now known in six counties. Instead of strengthening the order the Board has practically nullified it by issuing a second one permitting the grower to prune instead of burn his bushes. Mr. Salmon criticises the order strongly, and points out that pruning cannot keep the mildew in check. He goes on to say:—"The Board of Agriculture, without any scientific leadership, have again temporised at the most critical stage. There is now but one opportunity remaining of dealing with the American gooseberry mildew and preventing it sweeping through the country, and that is to deal with the disease this winter, but it must be by thorough and uncompromising measures." He recommends systematic destruction of every infected bush in the country, compensation to be awarded out of the Treasury. If this is not done, he thinks gooseberry growing will cease to be a commercial possibility in England.

A pamphlet has recently been issued by Mr. E. S. Salmon on the "black scab" or "warty disease" of potatoes (*Chrysophlyctis endobiotica*, Schilb.). This dangerous disease, which came over from the Continent about 1895, now occurs in nine counties in England and Scotland, and seems likely to spread throughout the country unless drastic preventive measures are taken. The fungus attacks the growing potatoes, causing the formation of wrinkled, warty excrescences which may become even larger than the actual potato itself; sometimes the stem and leaves are similarly attacked. Spores can remain in the ground for two years at least, and there is evidence that they can remain dormant for six years. Mr. Salmon urges the desirability of bringing this disease under the Destructive Insect and Pest Act. It would certainly seem desirable that the Board of Agriculture should have expert guidance in connection with this new Act, so that diseases could be brought within its scope directly they appear, instead of waiting until considerable damage has been done.

The *Agricultural Journal of the Cape of Good Hope* for January contains an account of the Kafir corn aphid (*Aphis sorghi*), an aphid which, as its name implies, badly attacks Kafir corn (*Sorghum vulgare*). It is stated that the pest is spreading, and is likely to be a serious matter in the near future owing to the great value of Kafir corn in Cape Colony; a thorough field study is desirable during January, February, and March, when the insect is on the corn. The same number also contains an article by W. Robertson on preventive inoculation of farm stock, dealing specially with lung sickness, anthrax, and black quarter.

The *Agricultural Journal of India* (October, 1907) contains several articles of interest to the large Indian agriculturist. The similarity between the conditions obtaining in Sind and in Upper Egypt is pointed out, a similarity which has enabled Egyptian cotton to be successfully grown where previously none could be obtained. Mr. Maxwell-Lefroy contributes a useful article on practical remedies for insect pests, and there is a good account, with illustrations, of the stock on the Government cattle farm at Hissar (Punjab).

Owing to the large number of new orchards coming into bearing in South Australia, the production of fruit is likely considerably to exceed the local demand; a detailed account of the process of fruit-drying is therefore given in the *Journal of Agriculture of South Australia* (December, 1907). The fruits dealt with are apricots and prunes; the instructions are very full, and should prove valuable to the fruit-grower. Another article deals with the banded pumpkin beetle (*Aulocophora hilaris*, Boisd.), which does considerable damage to melons.

The December (1907) number of the *Agricultural Journal of the Cape of Good Hope* contains an article by Mr. Lounsbury on the Plasmopara vine disease in Algeria, in which attention is directed to the similarity between Algeria and Cape conditions. No remedy for the disease is known, and the Cape authorities are naturally anxious that they may remain free from it. There is also a report on various methods tried for the destruction of the prickly pear. This tree spreads rapidly on ground which is not being actually cultivated, and is found seriously to injure the ground for cultivation. The best and simplest method found was to cut down the tree, spray the heaps with sodium arsenite solution, and then inject a 10 per cent. solution of the same salt into the stumps still left in the ground. This journal adopts the very useful plan of publishing the lectures given at the Rhodes University College during the vacation courses in agriculture, by which means they are made known to a much wider circle than would otherwise be possible. All the lectures deal with important agricultural problems. In the present number the breeding and grazing of Angora goats is gone into at length; there are also two articles on the management of ostriches.

We have received three leaflets from the Board of Agriculture, No. 195 dealing with the American gooseberry mildew, No. 199 with the pine disease, and No. 202 with the frit fly. The pine disease is caused by *Diplodia pinea*, Kickx., a wound parasite, the mycelium of which extends rapidly towards the tip of the shoot and takes up the food supply. After a short time all the leaves fall and the plant dies. The frit fly (*Oscinis frit*) is stated to be one of the chief cereal pests in Europe; the chief damage in Great Britain is to oats, and there are Continental records of attacks on barley, wheat, rye, maize, and various grasses. It appears that early sown crops are less liable to be attacked than late sown.

In the January number of the *Journal of the Department of Agriculture and Technical Instruction for Ireland* there is a full report of the first address by the new vice-president to the council, which affords eloquent testimony to the value of the work done by Sir Horace Plunkett. Itinerant instructors are now at work in every county; in addition, winter classes are held in thirteen counties at thirty-two centres, the number of pupils attending being estimated at five hundred. Twenty-six students are training at the Royal College of Science for teaching appointments, fifty-seven are studying at Glasnevin with the view of actual farming, and there are also three smaller institutions with fifty-nine students between them. The prosperity of the country is increasing; the export of eggs increases rapidly, and is now valued at 2,500,000.; poultry are also being sent out in greater number and of better quality. Schemes are on foot to study the production of winter butter, to increase the forest land, to set up cattle dispensaries in certain counties, and to push the sale of Irish produce in the English markets. All this is excellent; we cannot, however, help feeling more than doubtful about another plan suggested for the future—of choosing Irishmen by preference for teaching posts. It would surely be much better to choose the best available man, quite regardless of his nationality.